Model Commerical Construction Project Analysis Framework

Author:	Abt Associates Inc.
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Purpose:	This file presents an assessment of cost and impact of compliance costs on a 1-acre site-size, commercial model construction project, assuming 100% cost pass through. The purpose of the model building project analysis is to develop the incremental compliance cost multipliers that are used to incorporate overhead, debt, and equity cost considerations into the engineering per-acre compliance cost values used in subsequent analyses. In the absence of an industry survey, the project model are based on EPA's best available data and assumptions concerning construction project characteristics, and are designed to depict the change in final sales price resulting from compliance with the proposed options for typical projects, representative of the type required to comply with the Proposed Rule. The model project analysis framework accounts for the timing of outlays and financing for land purchase, development, and construction, as well as the timing for incurring compliance outlays and the ultimate sale of the model construction project. EPA then calculated the discounted present value of project outlays; effectively collapsing the time-explicit framework into a single-period equivalent analysis.

Worksheet:	**Contents:**
Variables	Lists the analysis variables, including the variable name, the Excel name (if it is a named variable in the Excel file), the value, and the data source. Cells shaded green can be manually changed in this file, cells shaded yellow are linked cells or calculated values.
1 Acre Project	Assesses the cost of the baseline project as well as the changes in cost elements associated with adding compliance costs during the land development project stage for the three proposed options. The compliance cost multiplier is estimated in row 70.

Linked Files (files whose data is used in this file):
Firm Analysis General Variables.xls
Single-Family Project Analysis Framework.xls

Assumptions for the Model Commercial/ Institutional Construction Project

Variable	Excel Name	Value	Data Source
Construction Project Type	Project_Type	**Commercial/ Institutional**	
Size of Project Land Parcel (acres)	Site_Size	**1.0**	
Cost-Pass-Through Fraction	CPT	**100%**	
Commercial Building Characteristics			
Average total constructed building area (square feet)	Total_Building_SqFt	**21,468**	Reed Construction database (Project-Level Information by Project Size.xls)
Average number of buildings per project	Num_Buildings	**1.0**	EPA assumption
Average number of units per building	Units_per_Building	**1.0**	EPA assumption
Average number of floors per building		**1.0**	EPA assumption
Average total building size (square feet)		**21,468**	Calculated from Reed data
Average footprint per building (square feet)		**21,468**	Calculated from Reed data
Average unit size (square feet)		**21,468**	Calculated from Reed data
Total building footprint (square feet)		**21,468**	Calculated from Reed data
Ratio of total footprint to site size (%)		**49.3%**	Calculated from Reed data
Ratio of paved surface area to site size (% parking, roads)		**36.0%**	CWP_imperviouslanduse_appendixD tables.xls
Ratio of sidewalk surface area to site size (%)		**1.0%**	CWP_imperviouslanduse_appendixD tables.xls
Paved surface area (square feet of parking, roads)	Total_Paved_SqFt	**15,682**	
Sidewalk surface area (square feet)	Total_Sidewalk_SqFt	**436**	
Total impervious surface area (square feet of paved surfaces and building fooprint)		**37,585**	*Impervious surfaces equal 86% of Site Size*
Land acquisition and development cost variables			
Cost of raw land (per acre)	Raw_Land_Cost	**$ 358,667**	Urban Land Institute 2000: Cost of raw land per acre (inflated using CCI)
Land development costs (per acre)	Develop_Cost	**$ 100,609**	Scaled from a 'per lot' basis to a 'per acre' basis using the cost 'per lot' and 'lots
Impact analysis (per acre)	Impact_Fees	**$ 13,255**	Scaled from a 'per lot' basis to a 'per acre' basis using the cost 'per lot' and 'lots
Land preservation and planting (per acre)	Land_Preservation	**$ 8,002**	Scaled from a 'per lot' basis to a 'per acre' basis using the cost 'per lot' and 'lots
Other Fees (per acre)	Other_Fees	**$ 13,743**	Scaled from a 'per lot' basis to a 'per acre' basis using the cost 'per lot' and 'lots
Other Costs (per acre)	Other_Costs	**$ 10,265**	Scaled from a 'per lot' basis to a 'per acre' basis using the cost 'per lot' and 'lots
Overhead costs	Overhead_Fraction	**10%**	NAHB 2007 National Results - Construction Costs for a Single-Family Unit
Construction cost variables			
Construction cost of new commercial/institutional construction (p	Construct_Cost_SqFt	**$ 131.2**	R.S. Means CostWorks data
Paving cost (per square foot)	Pave_Cost	**$ 1.33**	R.S. Means CostWorks data
Sidewalk construction cost (per square foot)	Sidewalk_Cost	**$ 4.38**	R.S. Means CostWorks data
Overhead costs	Overhead_Construct	**10.0%**	NAHB 2007 National Results - Construction Costs for a Single-Family Unit
Real estate cost variables			
Marketing fees (% of project value)	Marketing_Fraction	**2.7%**	NAHB 2007 National Results - Construction Costs for a Single-Family Unit
Real estate sales commission (% of project value)	Sales_Fraction	**4.6%**	NAHB 2007 National Results - Construction Costs for a Single-Family Unit
Financing terms variables			
Loan-to-value ratio for land acquisition	Fraction_Debt_Land	**65%**	FDIC Real Estate Lending Rules
Loan-to-value ratio for land development	Fraction_Debt_Develop	**75%**	FDIC Real Estate Lending Rules
Loan-to-value ratio for construction	Fraction_Debt_Construct	**80%**	FDIC Real Estate Lending Rules
Time period when land acquisition is initiated (project-year)	Land_Start	**1.0**	EPA assumption
Time period when development is initiated (project-year)	Develop_Start	**2.0**	EPA assumption
Time period when construction is inititated (project-year)	Construct_Start	**3.0**	EPA assumption
Time period when revenue is realized (project-year)	Revenue_Year	**4.0**	EPA assumption
Debt Cost	Debt_Cost	**7.0%**	Firm Analysis General Variables.xls
Equity Cost	Equity_Cost	**13.54%**	Firm Analysis General Variables.xls
Incremental Compliance Costs			
Compliance outlay for land development (per acre)			
Option 1	OP1	**$ 927**	
Option 2	OP2	**$ 4,776**	
Option 3	OP3	**$ 5,670**	
Placeholder 1	OP4	**$ -**	
Placeholder 2	OP5	**$ -**	
Placeholder 3	OP6	**$ -**	

Analysis of a Model 1-Acre Commercial/ Institutional Construction Project

Project Cost Element	*Baseline*	*Option 1*	*Option 2*	*Option 3*
Land Acquisition				
Land Costs				
Raw land cost	$ 358,667	$ 358,667	$ 358,667	$ 358,667
Debt Cost for Land Acquisition				
Land acquisition loan value	$ 233,134	$ 233,134	$ 233,134	$ 233,134
End-of-project acquisition loan balance	$ 305,591	$ 305,591	$ 305,591	$ 305,591
Equity Cost for Land Acquisition				
Capital outlay for land acquisition	$ 125,533	$ 125,533	$ 125,533	$ 125,533
End-of-project capital balance	$ 208,627	$ 208,627	$ 208,627	$ 208,627
Total Land Acquisition Cost	**$ 514,217**	**$ 514,217**	**$ 514,217**	**$ 514,217**
Land Development				
Development Costs				
Land development	$ 100,609	$ 100,609	$ 100,609	$ 100,609
Impact analysis	$ 13,255	$ 13,255	$ 13,255	$ 13,255
Land preservation and planting	$ 8,002	$ 8,002	$ 8,002	$ 8,002
Other fees	$ 13,743	$ 13,743	$ 13,743	$ 13,743
Other costs	$ 10,265	$ 10,265	$ 10,265	$ 10,265
Overhead costs	$ 14,587	$ 14,587	$ 14,587	$ 14,587
Compliance Outlay	$ -	$ 927	$ 4,776	$ 5,670
Debt Cost for Land Development				
Land development loan value	$ 120,344	$ 121,039	$ 123,927	$ 124,597
End-of-project development loan balance	$ 147,427	$ 148,278	$ 151,815	$ 152,637
Equity Cost for Land Development				
Capital outlay for land development	$ 40,115	$ 40,346	$ 41,309	$ 41,532
End-of-project capital balance	$ 58,717	$ 59,056	$ 60,465	$ 60,792
Total Land Development Cost	**$ 206,144**	**$ 207,334**	**$ 212,280**	**$ 213,429**
Construction				
Construction Costs				
Project construction	$ 2,817,031	$ 2,817,031	$ 2,817,031	$ 2,817,031
Road construction	$ 20,857	$ 20,857	$ 20,857	$ 20,857
Sidewalk construction	$ 1,908	$ 1,908	$ 1,908	$ 1,908
Overhead	$ 283,980	$ 283,980	$ 283,980	$ 283,980
Compliance Outlay				
Debt Cost for Construction				
Construction loan value	$ 2,499,020	$ 2,499,020	$ 2,499,020	$ 2,499,020
End-of-project construction loan balance	$ 2,861,128	$ 2,861,128	$ 2,861,128	$ 2,861,128
Equity Cost for Construction				
Capital outlay for construction	$ 624,755	$ 624,755	$ 624,755	$ 624,755
End-of-project capital balance	$ 805,406	$ 805,406	$ 805,406	$ 805,406
Total Construction Cost	**$ 3,666,534**	**$ 3,666,534**	**$ 3,666,534**	**$ 3,666,534**
Analysis of 1-Acre Commercial/ Institutional Construction Project Assuming 100% Cost-Pass-Through				
Estimate Sales Price to Consumer				
Total project cost before real estate fees	**$ 4,386,896**	**$ 4,388,086**	**$ 4,393,032**	**$ 4,394,180**
Number of units	1	1	1	1
Price per unit before real estate fees	**$ 4,386,896**	**$ 4,388,086**	**$ 4,393,032**	**$ 4,394,180**
Marketing fees	$ 116,428	$ 116,460	$ 116,591	$ 116,622
Sales commission	$ 201,666	$ 201,720	$ 201,948	$ 202,000
Final project cost	**$ 4,704,989**	**$ 4,706,266**	**$ 4,711,570**	**$ 4,712,802**
Final sales price per unit	**$ 4,704,989**	**$ 4,706,266**	**$ 4,711,570**	**$ 4,712,802**
Estimate Developer's Return on Equity				
Total project cost before real estate fees	**$ 4,386,896**	**$ 4,388,086**	**$ 4,393,032**	**$ 4,394,180**
Total project outlays	**$ 3,642,901**	**$ 3,643,828**	**$ 3,647,677**	**$ 3,648,572**
Capital outlays	$ 790,403	$ 790,635	$ 791,597	$ 791,821
Present value of capital outlays	$ 645,488	$ 645,692	$ 646,539	$ 646,736
Debt service	**$ 461,648**	**$ 461,804**	**$ 462,454**	**$ 462,605**
Final equity balance	**$ 1,072,750**	**$ 1,073,089**	**$ 1,074,498**	**$ 1,074,825**
Return on equity	**13.54%**	**13.54%**	**13.54%**	**13.54%**
Estimate Incremental Impact on Sales Price to Consumer				
Compliance costs per unit as % of baseline sales price		**0.020%**	**0.102%**	**0.121%**
Change in consumer's price per unit		**$ 1,276.72**	**$ 6,580.87**	**$ 7,812.98**
Change in consumer's price per unit		**0.027%**	**0.140%**	**0.166%**
Compliance cost multiplier		**1.38**	**1.38**	**1.38**
Estimate Incremental Impact on Developer's Return on Equity				
Change in developer's return on equity		**0.000%**	**0.000%**	**0.000%**